

CLAIMS

What is Claimed is:

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1. A method of extracting metals from a target material, comprising:
providing a target material;
forming a first mixture by mixing said target material with metal and a hydrocarbon
material; and
roasting said first mixture.

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2. The method of claim 1 wherein said roasting said first mixture is conducted
in an induction furnace.

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3. The method of claim 1 further comprising providing said target material in
particulate form.

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4. The method of claim 1 further comprising providing said metal as copper in
a particulate form.

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5. The method of claim 1 further comprising providing said hydrocarbon
material in particulate form.

6. The method of claim 1 further comprising:
adding borax to said roasted first mixture; and
smelting said borax and said roasted first mixture.

7. The method of claim 1 further comprising:
grinding said roasted first mixture;
mixing a hydrocarbon material with said ground roasted first mixture to form a second
mixture; and
5 roasting said second mixture.

8. The method of claim 7 wherein said roasting said second mixture is
conducted in an induction furnace.

9. The method of claim 7 further comprising:
adding borax to said roasted second mixture; and
smelting said borax and said roasted second mixture.

10. The method of claim 7 further comprising providing said hydrocarbon
material for said second mixture in particulate form.

11. The method of claim 7 further comprising:
grinding said roasted second mixture;
mixing a said weight unit of hydrocarbon material with said ground, roasted second
mixture to form a third mixture; and
20 roasting said third mixture.

12. The method of claim 11 wherein said roasting of said third mixture is
conducted in an induction furnace.

13. The method of claim 11 further comprising:
adding borax to said roasted third mixture; and
smelting said borax and said roasted third mixture.

14. The method of claim 11 further comprising:
grinding said roasted third mixture to form a ground mixture; and
roasting said ground mixture.

5 15. The method of claim 14 further comprising:
adding borax to said roasted ground mixture; and
smelting said borax and said roasted ground mixture.

10 16. The method of claim 14 wherein said roasting said ground mixture is
conducted in a hydrogen furnace.

15 17. The method of claim 7, further comprising:
grinding said roasted second mixture; and
roasting said ground, roasted second mixture.

18. The method of claim 17 wherein said roasting said ground, roasted second
mixture is conducted in a hydrogen furnace.

20 19. The method of claim 1, further comprising:
grinding said roasted first mixture; and
roasting said ground, roasted first mixture.

25 20. The method of claim 19 wherein roasting said ground, roasted first mixture
is conducted in a hydrogen furnace.

21. A method of extracting metals from a target material, comprising:
providing a weight unit of target material in particulate form;
forming a first mixture by mixing said weight unit of target material in particulate form
with a weight unit of metal and a weight unit of hydrocarbon material;
5 roasting said first mixture; and
grinding said roasted first mixture.

22. The method of claim 21 wherein said roasting said first mixture is
conducted in an induction furnace.

23. The method of claim 21 wherein said metal comprises copper in a
particulate form.

24. The method of claim 21 wherein said hydrocarbon material is in particulate
form.

25. The method of claim 21 further comprising roasting said ground roasted
first mixture in a hydrocarbon furnace.

26. The method of claim 21 further comprising:
adding borax to said ground, roasted first mixture; and
smelting said borax and said ground, roasted first mixture.

27. The method of claim 21 further comprising:
25 mixing a said weight unit of hydrocarbon material with said ground, roasted first mixture
to form a second mixture; and
roasting said second mixture.

28. The method of claim 27 wherein said roasting of said second mixture is conducted in an induction furnace.

29. The method of claim 27 further comprising:
5 grinding said roasted second mixture;
mixing a said weight unit of hydrocarbon material with said ground, roasted second mixture to form a third mixture; and
roasting said third mixture.

10 30. The method of claim 29 wherein roasting of said third mixture is conducted in an induction furnace.

31. The method of claim 27 further comprising:
15 grinding said roasted second mixture; and
roasting said ground, roasted second mixture to form a smelting mixture.

32. The method of claim 31 wherein said roasting said ground, roasted second mixture is conducted in a hydrogen furnace.

20 33. The method of claim 31 further comprising:
grinding said smelting mixture;
adding borax to said ground, smelting mixture; and
smelting said borax and said ground, smelting mixture.

25 34. The method of 21 wherein said hydrocarbon material comprises flour.

35. The method of claim 21 wherein said hydrocarbon material comprises plastic.

36. The method of claim 21 wherein said hydrocarbon material comprises wood.

37. A method of extracting metals from a target material, comprising:
5 providing a weight unit of target material in particulate form;
mixing said weight unit of target material in particulate form with a weight unit of
particulate copper and a weight unit of flour;
roasting the mixture of target material, copper and flour in an induction furnace;
transforming the induction-roasted mixture into particulate form;
10 roasting the transformed, induction-roasted mixture in a hydrogen environment;
transforming the hydrogen-roasted mixture into particulate form;
adding borax to the transformed, hydrogen-roasted, particulate mixture; and
smelting the hydrogen-roasted, particulate mixture in combination with the borax.

38. The method of claim 37 wherein said providing a unit of target material in
15 particulate form comprises grinding a weight unit of target material into particles of a
mesh size of no more than about one hundred.

39. The method of claim 37 further comprising providing said particulate
20 copper as copper particles of a mesh size of no more than about one hundred.

40. The method of claim 39 further comprising providing said particulate
copper of a purity of between about 999.0 and about 999.9.

41. The method of claim 39 further comprising providing said particulate
25 copper comprising dendritic copper.

42. The method of claim 39 further comprising providing said particulate
copper comprising flat, irregular shaped copper particles.

43. The method of claim 37 further comprising providing said flour as coarsely ground flour.

44. The method of claim 43 further comprising providing said flour comprising wheat flour.

45. The method of claim 43 further comprising providing said flour as particles having a mesh size between about one hundred and about twenty.

46. The method of claim 37 further comprising operating the induction furnace at a frequency of between about one thousand and about ten thousand cycles per second (1kHz and 10kHz).

47. The method of claim 37 further comprising operating the induction furnace at a frequency of about three thousand cycles per second (3kHz).

48. The method of claim 37 further comprising maintaining an internal temperature of the induction furnace below the melting point of copper during the roasting therein.

49. The method of claim 37 wherein transforming the induction-roasted mixture into particulate form comprises grinding the induction-roasted mixture into particles having a mesh size of no more than about one hundred.

50. The method of claim 37 wherein said roasting the transformed, induction-roasted mixture in a hydrogen environment comprises roasting the transformed mixture in a hydrogen furnace.

51. The method of claim 50 further comprising operating the hydrogen furnace at a temperature between about 850 degrees C and about 900 degrees C.

52. The method of claim 50 further comprising roasting the transformed, induction-roasted mixture in the hydrogen furnace for about one to about three hours.

53. The method of claim 37 wherein transforming the hydrogen-roasted mixture into particulate form comprises grinding the hydrogen-roasted mixture into particles having a mesh size of no more than about one hundred.

54. The method of claim 37 wherein said adding borax to said transformed, hydrogen-roasted mixture comprises adding an amount of borax substantially equal to about two times the weight of the transformed, hydrogen-roasted mixture to the transformed, hydrogen-roasted mixture.

55. The method of claim 37 further comprising smelting the hydrogen-roasted, particulate mixture in combination with the borax in an induction furnace.

56. The method of claim 55 further comprising operating the induction furnace during the smelting at a temperature between about 3800 degrees F and about 4000 degrees F.

57. The method of claim 55 further comprising smelting within said induction furnace for a period of about 45 minutes to about 210 minutes.

58. The method of claim 37 wherein said target material is selected from the group consisting of ore, fly ash, bottom ash from coal fired processes, mine tailings, precipitates from leach solutions and pure elements.

59. The method of claim 37 wherein said roasting said mixture of target material, copper and flour in an induction furnace exposes said mixture to an environment wherein heat is generated through coupling energy from an induction furnace coil in said induction furnace and transferred to a wall of a reaction vessel comprising a shortened transformer turn, wherein said reaction vessel contains said mixture of target material.

60. The method of claim 59 wherein said roasting said mixture of target material, copper and flour in an induction furnace exposes said mixture to an environment wherein an intense magnetic field varying at critical frequencies is generated by currents in at least one of said walls of said reaction vessel and said induction furnace coil.

61. The method of claim 59 wherein said roasting said mixture of target material, copper and flour in an induction furnace exposes said mixture to an environment wherein opposing electrical fields are generated along a helical transmission line formed by said furnace coil such that a magnitude and direction of said opposing fields is canceled, to create a scalar potential within said vessel.

62. A method of extracting metals from a target material, comprising:
obtaining a unit of target material having a defined weight;
grinding the unit of target material into particles having a size of one hundred mesh or less;
forming a mixture comprising mixing a weight unit of target material, a weight unit of coarsely ground wheat flour, and a weight unit of copper, said copper comprising a plurality of dendritic copper particles of a purity of about 999.5 and having a size of no more than about one hundred mesh or smaller;
performing a first induction roast upon said mixture, said induction roast comprising filling a container with the mixture, inserting the container into a preheated induction furnace to ignite the mixture, roasting the mixture in the induction furnace at a temperature below the melting point of copper until combustion exhibited by the

mixture substantially subsides, transferring the mixture to a sealed container, and cooling the mixture in the sealed container;
grinding the cooled mixture from the first induction roast into particles having a mesh size of no more than about one hundred mesh;
5 performing a hydrogen roast upon an at least once induction roasted mixture comprising transferring the at least once induction roasted, ground mixture into a container, placing the container into a hydrogen furnace, roasting the at least once induction roasted mixture in said hydrogen furnace at a temperature of about 850 to 900 degrees C for a period of about 2 hours to about 4 hours;
10 grinding the mixture resulting from the hydrogen roast into particles having a mesh size of no more than about one hundred mesh;
combining with the ground mixture resulting from the hydrogen roast an amount of borax, by weight of at least two times the weight of the resulting mixture, placing the borax and final mixture into a crucible, inserting the crucible into an induction
15 furnace operating at a temperature of between about 3800 degrees F and about 4000 degrees F for about 45 minutes to about 3 hours.

63. The method of claim 62 further comprising, before performing the hydrogen roast:

20 mixing the ground, roasted mixture from the first induction roast with a said weight unit of coarsely ground wheat flour to form a second mixture;
performing a second induction roast on the second mixture, said second induction roast comprising filling a container with the second mixture, inserting the container into a preheated induction furnace to ignite the second mixture, roasting the second
25 mixture in the induction furnace at a temperature below the melting point of copper until combustion exhibited by the second mixture substantially subsides, transferring the second mixture to a sealed container, and cooling the second mixture in the sealed container; and

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